Crumpler Plastic Pipe, Inc.

Manufacturers of Corrugated Plastic Drainage Pipe

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ROSEBORO, NORTH CAROLINA 28382-2068

October 31, 2006

To: Mr. Alan Rawson
New Hampshire Department of Transportation

From: Ralph Hayes
Crumpler Plastic Pipe, Inc.

Subject: Quality Systems Manual

Thanks so much for your review of the Quality System Manual as submitted by Crumpler Plastic Pipe, Inc.

I would like to add clarification to the (4) four items in question.

Item No. 1 – The paragraph was restructured to clarify the different resins, and requirements.

Item No. 2 – In July of this year we lost our Quality Assurance Director due to serious health problems. So we are only submitting documents concerning the ongoing training mode of the new individual filling that position.

Item No. 3 – Our Program on the computer cannot be changed, but we will add the test results for elongation, low temperature flexibility, ESCR and joint integrity into the space currently marked notes. These results will be included for applicable products.

Item No. 4 – The statement has been included in revision 2 of the QSM.

Please consider the submission of the QSM, with recent changes and additions.

Thanks,

Ralph Hayes

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Quality System Manual

Date: July 14, 2006 **Rev: 2**

Crumpler Plastic Pipe Incorporated

Quality Systems Manual

Eastern States Consortium HDPEP Program

CT, DC, DE, MA, ME, MD, NC, NH, NJ, NY, PA, RI, VA & VT

QSM

Rev: 2
July 14, 2006

Introduction

Crumpler Plastic Pipe, Inc. has developed and established this manual to describe procedures pertaining to quality within our plant. This manual outlines the basic Quality Control procedure for this plant, from resin receipts and storage to the production of pipe which includes the identification of any manufacturing defect, statistical control, handling, storage and delivery.

Crumpler Plastic Pipe, Inc. has implemented and expects a high level of quality control from its manufacturing facility. This intense monitoring and quality control of our production will indicate any upset in quality and detection of non-compliance products. It also allows Crumpler personnel to identify the causes of non-compliance and to take the appropriate measures to eliminate them. These quality control procedures, exceed the requirement of current standards, and ensure documentation as required to limit liability and to allow for the issuance of guarantees on both materials and workmanship of products.

Attachment No. 1 indicates the local driving instructions of the physical location.

QSM

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Crumpler Plastic Pipe, Inc. is a single site entity with the manufacturing facility, sales and corporate offices, laboratory, storage yard and shipping offices located at 852 Autry Highway, Roseboro, North Carolina, 28382.

Crumpler Plastic Pipe, Inc. manufactures a number of High Density Corrugated Products as listed on our web site, **www.cpp-pipe.com**.

Corrugated Pipe Sizes are:

Single Wall	4 inch thru 24 inch diameter
Double wall	4 inch thru 48 inch diameter

The director of quality assurance for Crumpler Plastic Pipe, Inc. (Ralph Hayes) is responsible for staff management, qualification of the technicians (quality controllers) management of all laboratory equipment and maintaining accrediation with the Eastern States Consortium. See Attachment II for Resume.

QSM

Rev: 2
July 14, 2006

1. QUALITY MISSION STATEMENT

It is the philosophy of the founders of Crumpler Plastic Pipe, Inc. to produce good quality products only. This important tradition means that any employee or piece of machinery is successful only if it produces a consistently excellent product.

In the competitive plastic pipe industry, only quality products and quality service will attract our customers. Each employee in the organization has the responsibility for quality management, planning in every area must lead to quality programs and activities.

In the plant, employees will be trained to recognize proper and accurate methods and sequences of work so they can detect abnormalities or defects. Corrected quality issues will eventually save us a valued customer.

Crumpler Plastic Pipe, Inc. will continue to have the reputation of producing the highest quality products. It is our responsibility to insure that the plant meet all quality standards and guide lines as established by all applicable standards.

Date: 10-31-06

Signed: John Crumpler

2. QUALITY CONTROL OF RAW MATERIALS

2.1 General Procedures

At Crumpler Plastic Pipe, Inc. our quality control begins with receipt of raw materials. We use High Density Polyethylene Resin that is either Natural or Pre-Mixed with carbon black. For natural resins carbon black must be added prior to extrusion of pipe. Resins are delivered to Crumpler Plastic Pipe by truck. Each truck has an approximate weight of 50,000 pounds. Each truck is assigned a lot number or tracking number that corresponds to the purchase order number used by Crumpler Pipe. See attachment 3.

Each vendor or resin manufacturer provides a certificate of analysis to Crumpler Plastic Pipe for approval, indicating the results obtained for the following:

Carbon Black Content ASTM D 4218 (where applicable)
Melt Index ASTM D 1238 (one test per lot)
Density ASTM D 1505 (one test per lot)
NCLS (provided by the resin supplier each 3 months)

Our resin suppliers, for single stream virgin resins, provide Crumpler Plastic Pipe, Inc. with certification that section 6.1 of M-294 is met. Occasionally different lots of resins, from different suppliers of resins, are blended. Blends are certified to meet the requirements of section 6.1 of M-294, through or by third party testing at an independent laboratory acceptable to the ESC. All resin test reports, for samples tested by or for Crumpler Plastic Pipe, Inc. are retained and available for review for a period of (5) five years.

The carbon black content if applicable if the resin is pre-mixed or compounded. When the resin is not pre-mixed, the carbon black is added by Crumpler Plastic Pipe during the manufacturing process of the pipe.

2.2 Resin Test Conducted by Crumpler Plastic Pipe

All resins used at Crumpler Plastic Pipe, Inc. must have their physical integrity evaluated and verified, before they are released for production. All incoming trucks are sampled from the resin pipe on the tanker truck by our quality control technician. Upon verification of resin compliance with specifications, the resin is pumped from the truck to the appropriate silo or box location.

A. The quality control technician samples each lot from under the truck.

B. The following tests are performed for compliance to applicable AASHTO Specifications.

Carbon Black Content ASTM D 4218 (where applicable)
Melt Index ASTM D1238
Density ASTM D 1505

C. After the resin has been verified as meeting production specifications (per AASHTO M 294), the resin is pumped into a silo dedicated to that resin or it is packaged into containers or boxes and labeled with the appropriate lot number and stored in our warehouse complex.

D. Resins that do not meet the specifications are returned to the vendors or suppliers.

2.3 Storage of Resins

When all tests on resins are completed and approved, the resin is pumped into the appropriate silo or packaged in gaylords and labeled with the lot number and stored in a warehouse for later use.

2.4 Resins to Manufacture fittings and couplings

The resins used to manufacture the Blow Molded fittings as well as the custom cut And welded smooth core fittings and couplings, is totally traceable using the same Lot number system as used for pipe production.

3. Quality Control of Pipe

3.1 Manufacturing Process

Crumpler Plastic Pipe, Inc. manufactures the following types of pipe:

A. Corrugated flexible pipe for drainage – complying with ASTM-F-405 and F-667 standards

B. Single wall corrugated pipe – complying with AASHTO M 252 or M 294 Standards

C. Corrugated pipe smooth interior liner – complying with AASHTO M 252 or M 294 standards

3.2 Test Methods

Crumpler Plastic Pipe, Inc. uses recognized test methods published by AASHTO and ASTM. All characteristics are tested in accordance with the specifications.

3.3 Frequency of Tests

Crumpler Plastic Pipe, Inc. defines a production lot as the quantity of pipe of the same size, type and designation that is manufactured on the same, single production line over a period of time not exceeding a (24) twenty-four consecutive hour period. Crumpler Plastic Pipe takes samples during the manufacturing process according to a pre-established frequency. Samples are given a lot number and dated (month – day – year).

The plant code embossed on the pipe completes the identification and insures full trace ability of any pipe produced by Crumpler Plastic Pipe.

Samples are conditioned at a temperature of 23 ± 2° C for a period of 24 hours prior to test unless otherwise indicated by the test specification.

Rev.2
July 14, 2006

(Number of Specimens per 24 hour unless otherwise noted)

	ASTM-AASHTO Method	AASHTO M-252	AASHTO M-294	AASHTO M-252	AASHTO M-294
Type		C or CP	C or CP	S or SP	S or SP
Unit Weight		3/shift**	3/shift**	3/shift**	3/shift*
Outside Diam	D 2122	2*	2*	2*	2*
Inside Diam	D 2122	2*	2*	2*	2*
Wall Thickness	D 2122	3/shift	3/shift	3/shift	3/shift
Distribution Inside	D 2122			1	1
Distribution Outside	D 2122			1	1
Pipe Length		2	2	2	2
Pipe Stiffness 5%		1	1	1	1
Pipe Flattening		1	1	1	1
Carbon Black Content	D 4218	1	1	1	1
Brittleness (impact)	D 2444	2/week	2/week	2/week	2/week
Elongation	D 2444	1/year	1/year	1/year	1/year
ESCR	D 1693	1/year	1/year	1/year	1/year
Perforation Area	Type 1 & 2				
Water Inlet Area	CP & SP	1/shift	1/shift	1/shift	1/shift
Low Temperature Flexibility	M-252	1/year	n/a	n/a	n/a
Workmanship	M252 – M294	Continuous through production run			
Markings	M252 – M294	Continuous throughout production run			
Joint Integrity	M-252	1/week		1/week	
	M-294		1/week		1/week

* Shared inspection by operator and quality controller
** Inspection by operator

4.0 Test Results Statistical Analysis

All test results will be incorporated into a computer database. Each month a report will be generated to show the average values of all tested parameters, per lot and production line. The data contained in this report will be used to show production tendencies and if necessary correct any deviations.

5.0 Non-Complaint Product

All pipe exhibiting signs of damage, or pipe that does not meet the appropriate standard or specification shall be identified as non-complaint and stored separately from the balance of the pipe inventory. A non-complaint report is generated for each one of the non-compliance's, and serves to identify the nature of the non-compliance. Any and all production made since the last successful test shall be quarantined until it can be evaluated, in order to determine the extent of the non-compliance. The only personnel who have the authority to evaluate non-compliant products is our director of manufacturing operations and the quality assurance director. Based on their evaluations each case will be resolved as follows:

A. Rejected: Pipe is ground up and used as regrind into future production.

B. Localized Damage: The damaged surface area is removed and the pipe is Dispositioned.

C. Downgraded: The pipe is re-classified as a different type or product that for which it Was originally manufactured. Markings are changed accordingly.

The reason for the failure must be documented in the inspection during the manufacturing process report along with the number for the non-compliance report.

6.0 Traceability of Products and of Test Results

Copies of all documentation pertaining to inspections and tests are kept on file for a period of 5 years and are available upon request for evaluation by the customer or their representative on Crumpler Plastic Pipe premises. This also includes ESC reports.

7.0 Quality Control Testing Facility (Lab)

The Quality Assurance Director is responsible for providing the necessary infrastructure to conduct tests according to all applicable standards. And will ensure that tests are

carried out by a quality controller who is trained and qualified according to the requirements as established by Crumpler Plastic Pipe, Inc.

The Quality Assurance Director has the authority to take any and all necessary corrective action, when and where necessary, to maintain quality production meeting applicable standards.

Copies of all applicable standards as well as the Quality System Manual shall be provided to the quality controller by the Quality Assurance Director.

The Crumpler Plastic Pipe Laboratory is equipped with most of the equipment necessary to carry out required test. We are currently seeking sources for a few items to be added as lab equipment. Until such time of procurement and installation, Crumpler Plastic Pipe, Inc. respectfully request testing be performed by an outside independent lab.

Each quality controller is responsible for maintaining a current file for every piece of equipment, and must contain the following information:

A. Manufacturers instructions and operating procedures
B. Calibrations certificates

Equipment should be calibrated once per year by Each a specialized testing laboratory. All calibrations should be traceable to the national calibration standard when possible or calibrated in compliance with an ASTM procedure. This calibration certificate will confirm the source of calibration standard.

Any and all repairs to the equipment are recorded in a designated file in the laboratory and the laboratory shall maintain records of all ESC reviews and actions taken to resolve deficiencies.

8.0 Quality Controller Qualifications

Crumpler Plastic Pipe, Inc., uses basic hiring practices considering – educational level and any previous experiences or positions that may enhance this position. All training records will be maintained and are available for review from our Human Resources Department.

Quality Controllers are trained as laboratory technicians. They have ample time in our lab to observe in detail the application of pertinent standards, the operation of lab equipment, the procedures required and used, calculations used and reporting. Witness – verification (audit) is performed on an annual basis to insure the quality controller is fully trained and is able to perform each of the required tests, through visual observation. Retraining is provided each time a test method is revised. All training is documented and recorded by the Quality Assurance Director, this documentation is maintained at the plant site and is available for review by ESC personnel.

9. 0 Identification of Pipe

All pipes have permanently embossed markings on the tops designated corrugations, that indicate the following:

A.. Crumpler Plastic Pipe, Inc. Logo and Location
B. Nominal Pipe Size
C. The manufacturing specifications (M-252, M-294)
D. Date (Month, Day, Year)
E. Special lots have labels affixed to the inside of the pipe showing lot numbers To insure full traceability.

10.0 Handling and Storage of Pipe

10.1 Equipment

Crumpler Plastic Pipe, Inc. uses specially adapted OSHA Approved Forklift Trucks to handle and load joints of pipe. Forks and or booms must be free of Rough edges or damaged surfaces to prevent damage to product.

10.2 Stock Pile of Pipe

Pipe is stored in separate stacks according to size and type and where possible by Manufacture date. To facilitate the loading of the proper product and to rotate Inventories. Stacks are positioned and laid out in pyramid stacks, the bottom rows Are braced or chocked to prevent movement under the weight and pressure of the Upper rows.

10.3 Storage Site

Pipe is stored directly on the ground on a smooth level surface. Prior to Placement of pipe any sharp or irregular objects must be removed, that may Cause damage or instability.

11.0 Internal Audit

The Director of Quality Assurance or their superior shall at least once per year ensure that the Quality Control Program is being maintained. The following criteria must be verified at that time:

A. Calibration of Equipment
B. Sampling method of Raw Material and control of lots.
C. Sampling and test methods of pipe.
D. Product Certification

E. Inspection and test reports
F. Non-Compliance reports

12.0 Annual Submission of Pipe Samples to an Independent Lab and release of data To ESC

Crumpler Plastic Pipe, Inc. will permit DOT inspectors access to the facility in Roseboro, N.C. Crumpler Plastic Pipe, Inc. shall have an independent laboratory evaluate two sizes of pipe in accordance with AASHTO, M-294 on an annual basis. The DOT inspector will select and label the samples to be tested. Each sample will be a split sample with the manufacturer and the independent test laboratory performing comparative testing. The results of which will be supplied to the ESC.

Resume of Ralph Hayes

1995 to Present Crumpler Plastic Pipe, Inc.

Plant Manager – responsibilities for production, maintenance, quality, shipping, Equipment evaluation and procurement.

1993 – 1994 Carlisle Plastics, Inc. Battleboro, NC Plant

Production Manager – responsible for production, maintenance, quality, shipping Of all construction and agricultural products

1987 – 1993 Carlisle Plastics, Inc.

Corporate Purchasing – responsible for purchasing resins, evaluations of resins for New product development, for approximately 10 plants.

1980 – 1986 Rex Plastics, Inc. – Purchased By Carlisle Plastics

Plant Manager – responsible for production, procurement of raw materials, Recycling, shipping, all quality control programs, new product Development at the Thomasville, NC Plant.

1969- 1979 Rex Plastics, Inc.

Production Supervisor – responsible for shift production, quality and maintenance

1965 – 1968 Rex Plastics, Inc.

Extrusion Operator – producing quality products in Thomasville, NC

1962 – 1965 United States Navy

1962 Graduated High School, Thomasville, NC
East Davidson High School

Incoming Material Log – Polyethylene Resins

Date	BOL #	Railcar or Truckload (R/T)	# Lots In Shipment	Certifications Received (Yes/No)	Plant Assigned Tracking Number	QC Samples Numbers	Melt Index Result	Density Results

Crumpler Plastic Pipe Inc.
Compression Test Report

Report Number	1659
Plant	crumpler
Nominal Diameter	15
Product	Smoothwall
Product Class	AASHTO M294
Production Date	May 23/06
Testing Date	5/19/06 1:41:28 PM
Lot Number	
Technician	H R
Line / Operator	201 J. Wms.
Shift	
Production Time	9:00 AM
Serial Code:	

Weight kg/ft	Weight lbs/ft	Sample Weight (lbs)	Sample Length (in)
2.401	5.29	6.89	15.625

% Deflection	Deflection	Force	Stiffness (kPa)	Stiffness (psi)
5%	0.755	658.5	383.95	55.8
10%	1.510	1075.5	313.55	45.6
20%	3.021	1293	188.48	27.4

psi/kPa is based on Actual Average ID

	1	2	3	4	5	6	7	8	
ID	15.13	15.13	15.06	15.13	15.13	15.00	15.13	15.13	in
OD	18.78								in
Inner Wall	0.086	0.070	0.066	0.072	0.073	0.079	0.081	0.074	in
Outer Wall	0.097	0.091	0.085	0.079	0.081	0.078	0.076	0.074	in
Corr Depth	1.677	1.671	1.692	1.708					in
Flatness									in
Pitch									in

Actual Min	Actual Max	Actual Average	Specs Min	Specs Max	In Spec
15.00	15.13	15.10	14.77	15.45	Yes
18.78	18.78	18.78	18.69	18.85	Yes
0.066	0.086	0.075	0.060	0.080	Yes
0.074	0.097	0.083	0.045	0.065	Yes
1.671	1.708	1.687	1.635	1.695	No
			0.000	0.000	N/A
			0.000	0.000	N/A

Perforations

Length (in)	Width (in)	Area (sq in)	Perf per 4":	Open Inlet/ft:
0.000	0.000	0.000	0.0	0.000

	1	2	3	4
Resin Code	VIR./PRI	VIR./UT.	VIR./OG.	
Resin %	33	33	32	
MI21 6				
MI5	0.317	0.297	0.227	
Density	0.952	0.956	0.951	

Out of Roundness

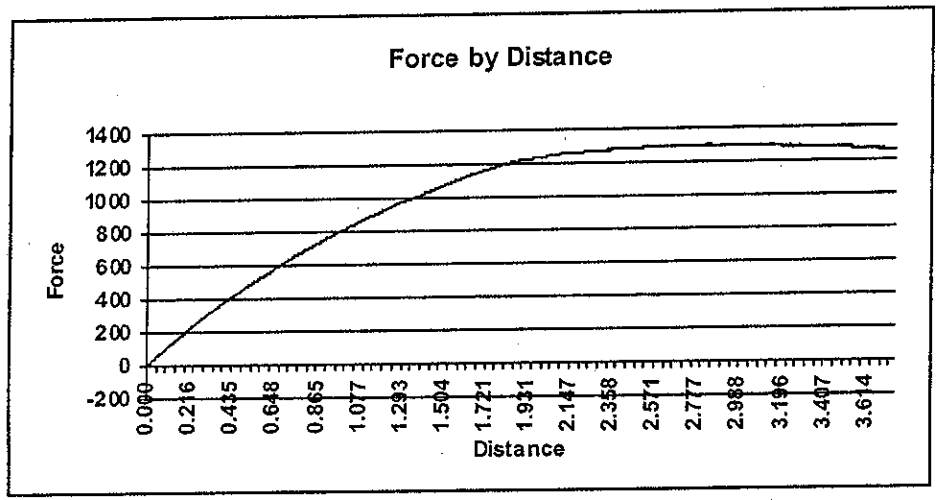
Avg ID	Tol. +/-	Min Tol.	Min Act.	Pass Min	Max Tol.	Max Act.	Pass Max
15.1	0.0	15.1	15.0	☐	15.1	15.1	☐

% Defl.	Bond Strength:	60% compression
25	No	No

Joules:	No. tested for impact	No. Passing Impact
0		

Notes:

0 ANGLE DEGREE
2% BLK CONC
QC LOT # 133
DOT PIPE



Crumpler Plastic Pipe, Inc.

Quality Control/Assurance Training/Competency Evaluation

Lab Location: Roseboro, N.C.

Tr'ee = Trainee, Tr'er = Trainer

Trainee Name:	Weight			Liner Thickness			Inside Diameter			Pipe Length			Brittleness			Workmanship			Carbon Content		
	Date	Tr'ee Initial	Tr'er Initial	Date	Tr'ee Initial	Tr'er Initial	Date	Tr'ee Initial	Tr'er Initial	Date	Tr'ee Initial	Tr'er Initial	Date	Tr'ee Initial	Tr'er Initial	Date	Tr'ee Initial	Tr'er Initial	Date	Tr'ee Initial	Tr'er Initial
H.L. Crumpler III	7/06	HC	RAH	10/06	HC	RAH	10/06	HC	RAH	7/06	HC	RAH				7/06	HC	RAH			

Trainee Name:	Marking			Perforations			Inlet Area			Pipe Stiffness			Elongation			Resin Melt Index			Resin Density			Resin NCLS		
	Date	Tr'ee Initial	Tr'er Initial	Date	Tr'ee Initial	Tr'er Initial	Date	Tr'ee Initial	Tr'er Initial	Date	Tr'ee Initial	Tr'er Initial	Date	Tr'ee Initial	Tr'er Initial	Date	Tr'ee Initial	Tr'er Initial	Date	Tr'ee Initial	Tr'er Initial	Date	Tr'ee Initial	Tr'er Initial
H.L. Crumpler III	8/06	HC	RAH							8/06	HC	RAH				10/06	HC	RAH	10/06	HC	RAH			

1) To attest that the training took place, the initials of both the trainee and the trainer are required.
2) The initialing trainer attests that the technician satisfactorily demonstrated the test.
3) If the training is due to test method modification, indicate by an asterisk next to the initials of the trainee.